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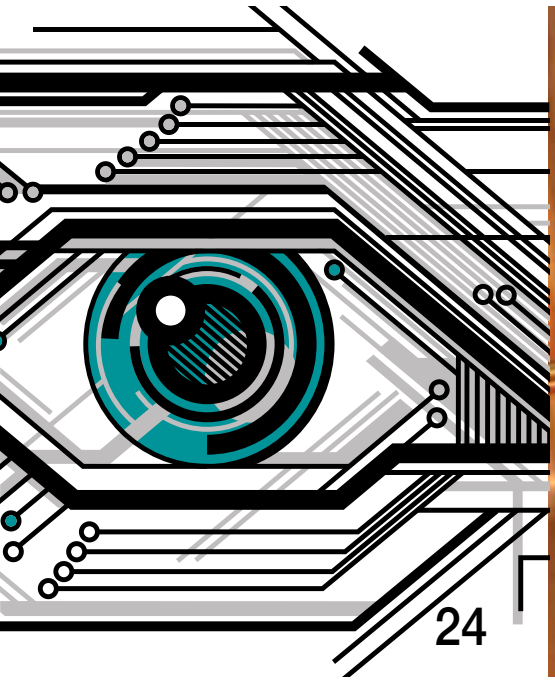

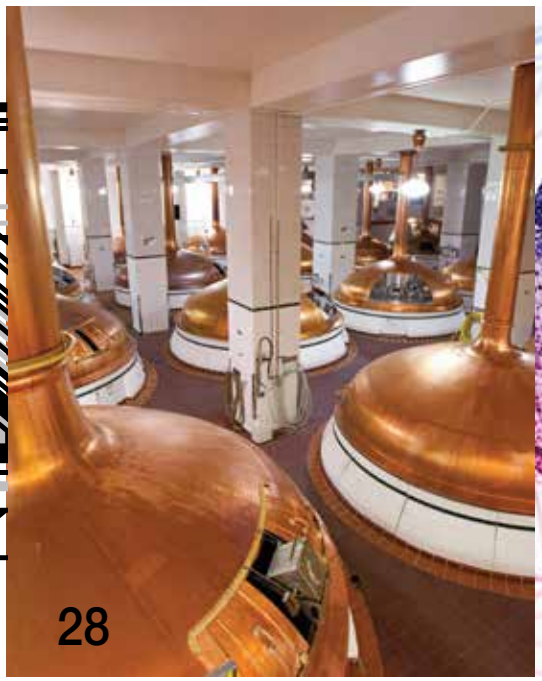

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A Note from the Editor

WHEN KIT BROWN-HOEKSTRA approached me to set up a meeting at the 2018 STC Summit to discuss our mutual interest in augmented and virtual reality (AR/VR), I was all in. As we explored possibilities for bringing this topic to the fore in the technical communication industry, my first thought was *Intercom*! After the very successful January-February 2018 issue on the Future of Technical Communication (guest-edited by Jack Molisani), I wanted to kick off the new year with a similar issue. The AR/VR topic seemed perfect, and Kit agreed!

As a too-early advocate of VR (Ames 1996), I mourned the lack of adoption of VRML (virtual reality modeling language) and related technologies to leverage 3D environments for learning and communicating technical subjects. I saw the impact advanced visualization, like VR, could have on communicating science to policy-makers and government funders while at the San Diego Supercomputer Center (SDSC)—one of the four U.S. National Science Foundation-funded hubs of the Internet at the dawn of the World Wide Web (remember when we used to capitalize all of that stuff?) in 1994. And I've been mooning over the possibilities ever since.

In this issue, past STC President and forward thinker (and good friend and travel buddy) Kit Brown-Hoekstra guest edits an outstanding issue on the many facets of augmented reality and virtual reality and their impact on our field, our jobs, and our capabilities. Kit is a consultant and owner of Comgenesis, working in the space between technical communication and localization to help companies build better processes and content so that they can effectively serve their customers, wherever they live and work. She is also a long-time leader in STC and sought-after speaker at many industry conferences, keeping herself in the vanguard of our field and sharing her knowledge generously.

Thank you to Kit for editing this informative issue, and to Ari Hoffman, Cruce Saunders, Dawn Armfield, Ann Hill Duin, Isabel Pedersen, Michael Humphrey, Kaden Strand, Myra Travin, and Elizabeth Losh for sharing their insights about AR/VR with *Intercom* readers.

In this issue, we begin a new column, "Content Engineering," authored by one of our industry's foremost content-engineering thought leaders, Cruce Saunders. Founder of [A], Cruce has long been a proponent of thinking in the right way about the intersection of content and technology, intelligent content, and how good content engineering can support delivering excellence in omnichannel experiences through well-structured content.

We've got some long-time favorite columns for you in this issue, as well:

- Alan Porter addresses the issue's theme by questioning the role content and content professionals have played, thus far, in the advancement of VR and AR.
- Kirk St.Amant provides a great overview of how we process information—specifically the recognition portion of the process and how communicators can leverage that to create better content.

As always, don't miss the Society Pages! Important member tidbits abound there!

While you're reading, I hope you are inspired to have a juicy conversation about some of these topics and issues with a colleague—or many! Kit,

the authors, and I would love to hear what you think of the issue and of the exciting—and perhaps a bit anxiety-inspiring—topics of augmented and virtual realities. Post something on your favorite social media platform and tag us!

- Kit on LinkedIn: *https://www.linkedin.com/in/kit-brown-hoekstra/*
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Did you know that you can comment on the web version of any article on *stc.org*? Start or join a conversation! I'll be looking for you!

— Andrea L. Ames
andrea@idyllpointllc.com

RESOURCES

Ames, Andrea L., David Nadeau, and John Moreland. *The 2.0 VRML Sourcebook, Second Edition*. New York, NY: John Wiley & Sons, 1996.

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From the Guest Editor

BY KIT BROWN-HOEKSTRA | *STC Fellow*

THE FUTURE of technical communication is visual and interactive. This statement should not come as a surprise to anyone who's been paying attention to the changing demographics of the workforce, the maturation of the technology that facilitates visual experiences, and customer expectations. Universities, such as Colorado State University, are building interdisciplinary design centers to explore best practices and to research the psychological and ethical implications of such interactions. Heavy equipment manufacturers are already realizing the benefits of augmented and virtual reality (AR/VR) on training and maintenance services. Airline pilots have been training with flight simulators for years, and the improvements in technology will continue to improve the training experience. Companies in other industries are also exploring how AR/VR can work for them.

This issue of *Intercom* explores how AR/VR might change the way technical communicators work and communicate in the coming decades. While only 5 percent of companies currently use AR/VR according to a recent survey by The Content Wrangler, many more are beginning to explore the possibilities. *Tech Crunch, ABI Research,* and *Business Insider* are predicting that by 2020 (just one year from now) the industry will grow to more than $100 billion dollars (Armfield et al., in this issue). We need to be ready when our companies start asking questions.

Ari Hoffman's article, "Augmented Reality | 2025 | Where Content and Context Meet at Midnight," provides us with a vision and a use case for how we might use AR/VR in our daily work. As you read, think about how content might need to be structured and integrated across organizations for this type of implementation to become a reality. What role will micro-content play, and how can we prepare today's content so that it's flexible enough to support tomorrow's needs?

Cruce Saunders gives us practical advice for developing workflows that support AR/VR in his article, "Emerging Methods for AR/VR Content Workflows: Moving Content into Three-Dimensional Space," and argues for ensuring that AR/VR "have a place in the intelligent, modular content ecosystem." Some of the areas where AR/VR initiatives are already gaining traction include quality assurance, product and experience testing, and automated troubleshooting.

Dawn Armfield, Ann Hill Duin, and Isabel Pedersen discuss the importance of a journey mindset when developing immersive content. The technologies to support AR/VR and the demand for such products and services is expected to grow exponentially in the next few years. Their article, "Immersive Content in Technical Communication: A Journey Mindset," discusses the importance of participatory design and empathy in developing these products, as well as what characteristics need to be part of this process.

In "Has Narrative Found a Challenge in Virtual Reality?" Michael Humphrey discusses the how AR/VR experiences and narratives can enhance each other. He touches on brain science and the ethics of engagement. These are important considerations in the development of AR/VR, and this article provokes more questions than it answers. Future discussions should expand to focus on the ethics and recommended practices for implementing AR/VR.

Kaden Strand discusses some of the tools being used to create AR/VR products, many of which borrow from the realm of game design. His article, "Sharing Ideas in Mixed Reality," also talks about how we can lower the barrier of entry as technology matures.

In her article, "A Mixed Reality Model for Immersive Learning Environments," Myra Travin proposes a transitional model for creating immersive learning environments as a way of reaping some of the advantages of AR/VR without breaking the budget.

Finally, in "Machine Vision and Augmented Reality," Elizabeth Losh points out some of the problems that can arise in AR/VR and machine learning when we use the wrong algorithms to produce an AR/VR experience.

This issue of *Intercom* is just the beginning of the discussion as we start examining the potential impact of AR/VR, not only on the ways in which we work and interact with our content, but also on the skills we need. Along the way, we also grapple with the ethical and accessibility considerations and the practical issues of creating strategies and architecture that support AR/VR.

RESOURCES

Abel, Scott. *The Content Wrangler 2019 Technical Information Industry Benchmarking Report.*

Augmented Reality | 2025 |

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Where Content and Context Meet at Midnight

By ARI HOFFMAN

LIKE A BUBBLE in water, whose structure is created by the water's seemingly infinite contact points around it, your technical content will be seen, heard, and experienced in myriad ways that will shape its structure. With augmented and virtual reality, we've just started exploring the possibilities of these shapes and touchpoints.

Priming the Mind

Imagine that you wake up in the middle of the night, the room nearly absent of all light as your eyes strain to adjust. Too tired to search for a switch, you stand up and begin the treacherous journey to your bathroom. Every single sense on high alert for obstacles, direction, balance, and efficiency.

Hands and arms extended feeling for something that isn't there, feet sliding in micro-strides anticipating the hard edge of your dresser, eyes desperately trying to dilate and focus to pick up even the slightest silhouette of familiar objects.

Your hearing is tuned to expert level, your touch is as sensitive as a fresh sunburn, and your optic nerves are working at full force to adapt. Though your brain is only half awake, your senses are working on overdrive, and you're focused on navigation with minimal pain.

Transport this notion to how field-service agents, Salesforce users, and DIY homebodies will experience your words in the depths of "Contentual Reality," where context meets content (at midnight).

Building a Bridge to Augment Experience

Hands sweep down toward your head; goggles slide over your eyes; lights, sound, and distance converge. Instantly, you've departed into a full-blown sensory experience.

Arriving deep into the structure, on a subterranean floor of a government construction site, a year and a half before ground breaking, you find yourself walking past unfinished walls, shoring, tiebacks, and curing concrete.

You're an electrical engineer looking for the clash detection that your CAD software exposed (where the systems in your design don't mesh properly). You need to re-route your conduit to avoid the support beams and ductwork in the lower, highly-secure floors, which are currently suspended over the same space.

Immersion into the virtual space helps you to make sure that your choices are not only aesthetically appealing, but also driven by efficiency and realistic implementation.

To gauge the situation appropriately, the environment is perfectly set to the time and place where the actual construction workers would find themselves while building your designs. In your virtual reality, yellow arrows blink and cycle as they guide you toward the area of detection. The room is dimly lit, full of echoes, and full of debris. You eventually find the clash, the parts glowing in a soft red hue, with neon yellow icons orbiting the area to signify the hidden text beneath each widget that describes the predicted cost of the change order, time delays, and product specifications.

With two hands, you reach up and grab the piping, pulling it down and around the duct, push it back up, and thread it through a two-inch space between the support beam and the corrugated steel floor of the level above.

Instantly, screws, cables, and different veneers start to fly into place and rearrange with each minor adjustment as you attempt different approaches.

To the sides of your hands, dynamic graphs pop up to display specification details, pricing sheets, lead times, and levels of execution probability. Spoken words start to relay concerns, recommendations, and fatal warnings. The voice is all around you, as the rest of your environment loses detail, and just the specific task has refined to absolute clarity.

The voice starts to question your thought process to better guide its recommendations. It asks if you would like to talk to Tim in accounting, because your latest attempt exceeds your budget overage. Simultaneously it displays a virtual holograph of Tim, rotating with all of Tim's credentials.

Just as it starts to dial Tim, you push the 3D audio icon located at the bottom right of your view corridor. The virtual assistant pauses, giving you time to think, to assess, to stop looking at the virtual clock counting down, with dollar signs signaling when your own time in the virtual space will become too expensive.

The idea blossoms, so you re-engage your assistant and flip the interrogation process back to the job at hand to confirm your brilliant new idea.

Success! Crisis averted, time and dollars saved, and the risk calculation shows that your project will qualify for a larger umbrella policy through your insurance provider. Later in the project, you will use augmented reality, projected with special glasses, to inspect the actual construction and ensure that the team built the design to your specifications.

In fact, your virtual assistant just reminded you that it's your anniversary in two days, and your husband has

been begging to go on a banana boat ride with you since November. The babysitter's calendar syncs, approves the dates, the Netflix account switches to PG-13 only, and the best airfare tickets available are purchased and confirmed.

Reaching Reality

Ok, that scenario might be a little more than 10 years out, but it might not. Today, we know that you aren't going to read a 259-page PDF about your washing machine, or ask Siri to read it aloud to you from beginning to end, just to find out how to untangle the jammed sock at the bottom of the agitator.

We (and Google) know that consumers of content need the right answer to the right product version (often without the right question), right when they're looking for it. That's why Google places such a high value on dynamically structured micro-content, with its ability to be rearranged in real time to create snippets of information that are sufficient to solve a problem.

In the interim, we have refrigerators that project light onto the floor so that our instructions have more space to be consumed in bulk. Such solutions are not ideal, however, and as the technology matures, we will see more sophisticated and useful iterations.

We already see field service reps with tablets and phones that can augment reality over parts on expensive machines. They even work on printed user manuals where the devices can project the parts in 3D with the ability to rotate, explode, and magnify inner schematics.

It won't be long before actual goggles are used to augment motors on cars so the novice mechanic can get in the game. So stay-at-home dads can build complex lighting solutions for their poorly lit kitchens. So teachers can engage elementary school students in ways that stimulate their imaginations, while focusing their attention and abundant energy.

Like the virtual assistant that the fictional electrical engineer used, the product details that the help icons rotated around, and the virtual construction manuals that the virtual assistant parsed while giving recommendations, content will be experienced, not consumed. It will live in space and time, and it will be driven by the atomic nature of our decision-making processes.

So, what does that mean for the technical communication profession?

It's just about to get really exciting! Your content will breathe new life, and your job will require you to manage the experiences it provides. Content meets context, or as I like to call it, "Contentual Reality."

Prepping Future-Flexible Content

From the earlier descriptions of virtual and augmented reality, we can see that the context is set, but how does your content support that reality?

If the field-service agent is on site fixing a broken bearing in a military jet stored in the belly of an aircraft carrier, lighting will change. As the agent looks at the part from one angle, she might have a dark and highly contrasted background where the light text can easily be seen, but if she rotates around the engine, there might be a ray of light piercing through the rusted steel hatch, where the color must automatically adjust to contrast the newly presented environment (like your car's navigation map changing colors for day or night driving).

If you think it's tough to get on page one of a Google search now, wait until everything is read to us, or even shown to us in 3D. The search-result real estate game will tighten even further, as consumers will have the patience to listen to only a couple of results before deciding.

Think about how this changes the ways we implement accessibility and localization. We need to think about the architecture and experience of our content to ensure that it supports all of our users, wherever they live and work.

Think about writing documentation for a Salesforce administrator who is setting up automation for their sales team. Now, instead of diving into the technical steps needed by each sales agent to successfully automate an opportunity, you will be a walking, talking tour guide in virtual, augmented reality.

You won't look at cells and formulas there. Each account will look like a building, with each contact in their own room, floors separating role designation, so you can visualize the company's organization chart and hierarchy. The individual rooms will be split in half, one side representing each employee's work environment (leather chair, minimal desk clutter, three clocks representing different global locations, and an assistant located just outside their office) and the other side, home life (kids running around, a barking Havanese puppy, and a giant flat screen TV playing the Dallas Cowboys with a stock ticker running across the bottom). Do you think that salesperson will have better insight into how to approach this person? Only if the journey is delivered to them in a way that is consumable, contextual, and driven by information-backed micro-content that can dynamically rearrange to fit the situation.

It's time to start thinking about the experience your content provides and how to design and deliver it so that the mapping to temporal and dimensional context is focal. What steps can you take now to ready your content for this brave new world? What amazing amalgamations can be formed that allow your content to live in every channel, at every touchpoint?

I dare you to jump head-first into your future-flexible, *contentual reality* and feel it surrounding your customers' experience along the way. I dare you.

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Emerging Methods for AR/VR Content Workflows: Moving Content into Three-Dimensional Space

By CRUCE SAUNDERS

AUGMENTED REALITY (AR) will likely touch each of our professional lives and the content we develop in the foreseeable future. It is critical that we develop plans to intelligently address this upcoming content output from the beginning, and that we don't develop more content silos in the process. AR has a significant impact on our quality assurance efforts, product and experience testing, and automated troubleshooting. By implementing AR effectively, we can ensure that it will have a place in the intelligent, modular content ecosystem and be a valuable asset to content engineers.

Investigating the Landscape of Augmented Reality for Technical Communication

Augmented reality (AR) is not all black goggles, gaming, and consumer applications. This emerging technology applies to the technical communication sector more than you might think.

Our goal in the content and communication profession is to deliver the right content as seamlessly as possible. Because augmented reality superimposes content over real-world environments, we are getting even closer to meeting users where they are.

A 2017 issue of *Time Magazine* predicted that "in 10-15 years augmented reality and virtual reality are going to become the primary use for computer interactions." Ambitious sounding, but new modes of interaction gain adoption every single day. The rate at which both conversational interfaces and wearables have become part of our everyday lives has been astounding. With lower costs and improved technology, augmented reality is certainly on the same path.

These advancements have led to new, more practical uses for AR. Several new applications for this technology will likely emerge in the content space:

- Quality assurance
- Product or experience testing
- Automated troubleshooting

With that said, organizations in the content space need to strategize for how they're going to address this new delivery channel in an intelligent way, without constructing yet another content silo.

To get insight into the current and future state of AR, I talked to experts from organizations that are already leveraging this technology. We discussed how they are using AR, where they are in the process, what they've discovered, and how to best include AR in an intelligent content framework.

More Than a Future Prediction: The State of AR Today

AR is here, and it's already transforming the technical content landscape. Farhad Patel and the technical documentation team at Huawei have made considerable progress in developing practical documentation solutions using AR.

Many of the products from Huawei's Enterprise and Carrier product lines involve servers, routers, cabinets, CPUs, and other devices that require documentation for installation or replacement tasks. With certain products, support staff needed to perform many installations or repairs per day. Also, training and ramp-up time for field staff needed to be reduced. Shorter training time and greatly reduced documentation volume were called for, even with increased product complexity.

The Huawei team saw AR as a game-changer for achieving of these goals. Patel explored how to make some critical installation or repair procedures foolproof.

In a YouTube video titled "Huawei SUN2000-25KTL - AR in Information Products," Huawei demonstrates how AR is enhancing their installation and maintenance operations. In this scenario, a field technician holds his tablet up to his work area. Technical instructions appear, step by step, at the bottom of the screen. In addition, support graphics are overlaid onto the tablet to help the user identify the correct object, demonstrate the action needed to complete the step, and offer on-demand support features.

As the video suggests, "real-time, contextual access to information leads to higher efficiency."

How Do AR Solutions Work?

There are many different approaches to AR, depending on the required solution.

Typically, the user sees live images of an object (product) through a mobile device (often a smartphone or tablet). The AR software on the device identifies and interprets live images by searching and comparing them with images stored in a local or remote database. Once matches are found, the AR device will simultaneously display or superimpose the digital content associated with a particular image.

This process continues seamlessly as the user changes orientation or moves around and as new images (people, places, or objects) come within range of the sensors (in this case, a camera). Superimposed content seamlessly changes on an as-needed basis to match what the user is seeing.

A simplified definition of the technology and hardware components behind a typical AR solution includes these items:

- QR codes
- 2D image tracking
- 3D edge-based tracking
- Simultaneous Localization And Mapping (SLAM)

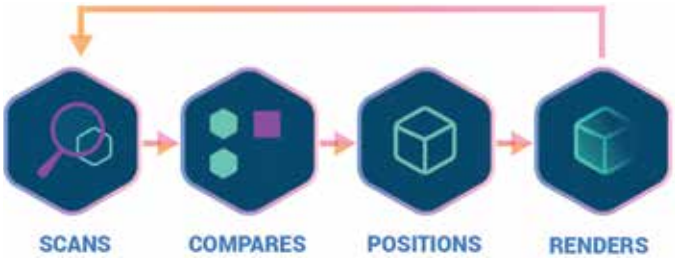

Figure 1. A simplified sequence of events that takes place 25 times per second with AR, based on Huawei's "Amplifying Content with Augmented Reality" diagram.

Lessons Learned: Some Surprises for Early Adopters

Early adopters are learning the hard lessons for us as they explore new content territory. Those working with augmented reality report some unique—and not-so-unique—challenges they face when embarking on these projects. Here are some points of advice and best practices to keep in mind.

- Identify what documentation can be converted into an AR experience with relative ease.
- Carefully select products that are capable of image tracking, and consider surface shine or lighting that current cameras can't deal with.
- Schedule for a longer-than-normal planning phase.
- Prepare content creators to deal with screen layout and display location of imposed images to keep a tracked object in view.
- Begin with a storyboard to illustrate each progressive view to develop a list of concepts or steps to provide.
- Be prepared to make more iterations than in traditional documentation and to master new testing routines that involve space, time, motion, and image tracking.
- "Thin down" digital assets to account for large file sizes and the pressure on power and computing resources. 3D models must also be thinned down to remove any proprietary information.

"We are no longer just authoring content for publication. With AR we are authoring an instructive experience for the customer."

– Farhad Patel, Huawei

The strategists that we talked to emphasized how important it is avoid being distracted by the tools themselves or by a "sexy demo" pilot project. Instead, focus on measurable business objectives, and choose your documented product and project wisely—preferably with steps that have been tested beforehand to reduce project development time.

Promising Results Encourage More Exploration

With significant challenges come significant benefits. Some customer case studies have documented 35 percent efficiency gains for new staff performing complex installations when using AR instead of traditional documentation. Early adopters are seeing other benefits:

- Classroom training has been drastically reduced—and in some cases, eliminated.
- The amount of text involved is substantially reduced, because information is delivered in context.
- Tasks can be significantly simplified, making it possible for less-skilled labor to perform some installations.
- Remote support is facilitated, because off-site staff can view what the user is viewing on their device, and annotations can be made on-screen by remote staff.
- The end user rarely needs to use search, as AR will push relevant visual content to the user based on context.
- AR can be used in QA due to superior camera tracking technology (vs. the human eye). Some customers are able to use AR cameras for testing procedures.

How Can We Prepare for AR?

Organizations use AR to deliver an in-context experience, rather than multi-channel documentation. As such, special consideration is needed to prepare content for intelligent delivery.

The screen real estate in many AR environments is dramatically smaller, so the text must be limited and positioned so that it does not obscure live, real-time images. Therefore, content needs to be divided into even smaller chunks to accommodate many AR displays.

In addition, content engineers need to prepare to carefully update their Master Content Model to accommodate the following new dimensions:

- Time
- Motion
- Space
- Image tracking
- Variable user viewpoints

With those elements in place, a short description tag in DITA specific to AR is assigned. During content creation, the content creator can decide which chunk should be delivered where and can wrap them in the appropriate tags. Then it is possible for a publishing system to push that content to the AR environment.

This might not only require new skills for content creators to master, but also a somewhat different mindset about how to view content while authoring.

What's on the Horizon?

Technology growth in sectors like artificial intelligence and machine learning are already helping to reduce the cognitive load that prevents humans from being more creative and productive workers.

Serving content in context through AR would be a tremendous step forward past the page-centric ecosystem that many technical communication practitioners (and customers) are struggling with.

Augmented reality is becoming an everyday reality sooner than we think. We must learn from the pioneers and adventure-seekers that thrive in our industry and begin now to educate ourselves about the opportunities and challenges that await us in this new arena.

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Immersive Content in Technical Communication: A Journey Mindset

By DAWN ARMFIELD, ANN HILL DUIN, ISABEL PEDERSEN

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A WHOLE HOST of sectors are incorporating immersive technologies for industrial and everyday use. *TechCrunch*, *ABI Research*, and *Business Insider* predict that the industry of augmented reality (AR) and virtual reality (VR) will reach more than $100 billion by 2020, with Apple, Microsoft, and Google making major investments in AR technologies (Evans and Koepfler).

Smart glasses use voice commands to free hands so workers can leave voice notes or instructions for others. AR is used to create more complex learning and on-the-spot access to information. Browsers use the camera view of smartphones to create a unique interface that blends and sustains "transductive relationships between multimedia, humans, and the environments we inhabit—such that all three of these spheres affect and become affected by one another" (Morey and Tinnell). The composing environment long ago shifted from a fully textual landscape to one that includes visual elements and multimodality. Now immersive technologies incorporate more sensory elements than ever before. In short, technical communication has reached its next threshold for change.

What skills do technical communicators need to develop content for these immersive technologies? Technical communicators must design content to be experienced and thus must begin with a journey mindset. We emphasize on the need for a journey mindset based on our experience in these areas:

- Curation of information on immersive technologies
- Examination of content development for immersive environments
- Expansion of understanding of audience in the design of immersive environments
- Development of a set of heuristics regarding the knowledge and skills needed to work within these environments

Curation

The Fabric of Digital Life research archive, or "Fabric," monitors the emergence of digital technology prototypes, inventions, news, and research by archiving representations in several categories and media types (text, image, video, etc.). Fabric concentrates on platforms of human-computer interaction to reveal the multiple ways that technologies emerge in society. To understand the depth and breadth of immersive technologies, and most recently, of AR, we curated a corpus of information on human-centered design for AR. As of this writing, these 223 artifacts allow us to see how the landscape of immersive technologies is shifting and how the understanding of our role as technical communicators in this landscape must also shift.

Based on this curation as well as our collective work in designing, deploying, and studying AR and VR devices, we emphasize that technical communicators must engage in participatory design and understand that immersive content demands an experiential mindset. Where once required to be objective and nonexistent in the presentation of information and documentation, technical communicators now must become a part of the process and integrate their own experiences into it.

Content Development

Content development for immersive environments is not new. For example, there has been significant immersive content development in curation and museum work. Some of the foremost museums are using immersive apps, such as Smartify, to increase audience engagement with exhibits. The focus of these types of apps is on the user's experience within the curated environment.

In medicine, the Federal Drug Administration (FDA) recently approved the use of one AR system, OpenSight Augmented Reality System, in surgical environments. This type of integration holds deep implications for technical communicators: "The technology also allows for a multi-user experience, as multiple HoloLens headsets can be worn among users for training or clinical purposes" (Rohman).

Developing training materials, enhancing clinical aids, or creating museum displays are just a few of the areas technical communicators work in. With these areas moving toward immersive technologies, it is imperative that technical communicators develop the skills needed to work in these environments.

A few years ago, Angie Li and Therese Fessenden writing for the Nielsen Norman Group, described what AR meant for user experience (UX). They argued that AR helps UX in three distinct ways: "1. By decreasing the interaction cost to perform a task, 2. By reducing the user's cognitive load, [and] 3. By combining multiple sources of information and minimizing attention switches."

What we understand now is that the implications of immersive technologies on UX or other technical communication areas go even deeper. Technical communicators must be able to draw on their knowledge of immersive environments, participatory design, audience analysis, and content development. By leveraging these skills, technical communicators can embrace a journey mindset.

A Journey Mindset

A journey mindset begins with participatory design. A focus on the role of the communicator as both developer and participant allows technical communicators to have a more integrated connection with content, as well as understanding why and how an audience might respond in certain ways. This is very similar to what technical communicators have always done in creating personas and profiles for usability or other documentation development. However, participating in this way also asks the technical communicator to become a part of the experience—to understand what is at stake from a subjective perspective and why that immersion into the development of the experience is imperative.

In addition to traditional personas, technical communicators must focus on the personas created by the content itself and how those personas in turn affect the audience. It's one thing to read text and follow instructions. It's wholly another to have a device connected to your body and to be immersed in the information.

A key component of participatory design is reflection. The concept of empathy, an inherently reflective practice, has been well developed in the context of design thinking. In technical communication, however, there is very little

scholarship on the incorporation of empathy into technical communicators' work.

Empathy is about more than understanding what an audience may think or feel; it is a deeper understanding of *why* an audience may think or feel in certain ways. The most commonly used definition of empathy is developed from Ralph Greenson's analysis, in which it is defined as the ability "to share, to experience the feelings of another person." The concept that a technical communicator actually experiences the feelings of his/her audience is at the crux of a journey mindset.

Another common definition comes from Eva Köppen and Christoph Meinal: "Empathy is the attempt to reconstruct the specific perspective of the other and how he perceives the situation. The aim of empathy is to construe mutual understanding." Once technical communicators understand how the audience will perceive the situation, they can begin to build better and more adaptive immersive environments.

Therefore, a journey mindset focuses on experiences. Our research in immersive technologies has led us to conclude that audiences in immersive environments are more engaged with the idea of an experience rather than with a straightforward explanation. For instance, the examples of museum curation and medical integration introduce the notion that while the information has always been available to the targeted audiences in the forms of signage, posters, brochures, or books, the *experience* of immersive technologies allows the audience to focus on the more detailed areas of information.

A museum-goer might be able to learn more about an artist with the touch of a finger to glasses. A medical student could learn that a cut to a certain organ could produce devastating effects and could see those effects without harming another human being. That experience adds to their body of knowledge, developing a deeper connection with their learning.

Sharing design principles for both AR and VR, Bobby Gill emphasizes that "people are seeking out experiences—not technologies" and that we should "shift our mindset to the world of 'first-person design' as compared to the third-person experience" and by so doing, that we should be prepared to give up a certain level of control over the experience, that we should toggle between focusing on how to navigate the experience and how to navigate within it, and that we should (of course) "iterate, test, learn, and repeat."

Our emphasis on a journey mindset was inspired by Robert Hoyle Brown's *Augmenting the Reality of Everything,* in which he stresses that the real value of immersive technologies will be realized once we begin to think "of every process—in every industry—in every interaction—as a journey." Focusing on AR, he writes that "AR can be a personal step-by-step process guide or 'Sherpa,' delivering just-in-time precision information, fusing things like training videos, sales spiels, and guidebooks into an intuitive, engaging, measurable, and actionable real-time immersive experience" (p. 8).

An immersive journey includes six elements:

- *Flow*, the overall actions required for the journey
- *Intro*, where the journey begins
- *Genre*, the context for the journey
- *Plot*, the central story or process
- *Vignette*, the visual vernacular style to establish the mood
- *Outro*, the shift back to the real world (pp. 14–15).

It is critical to remember that each audience engages with each element in a unique way.

Heuristics

Figure 1 illustrates a heuristic that we have constructed to guide technical communicators as they embark on this journey mindset. These heuristics are predicated on years of research within immersive technologies, design, UX, and audience analysis.

Figure 1. Heuristics for human-centered content design in augmented reality.

As part of these heuristics, we include these framing questions:

- **Authenticity:** What is my audience's point of view? Is it controlled by the user or independent of the user? Is it meaningful? Is it credible (ethos)?
- **Embodiment:** How might I position the audience in this augmented place?
- **Empathy:** Why does my audience think or feel in certain ways?
- **Accessibility**: Can my audience access or experience the augmented environment?
- **Usability:** Is the environment usable for various audiences?

- **Experience:** What journeys do my audiences seek, and how might I augment each experience?
- **Immersion:** How might the augmentation allow me to create experiences not possible in the physical world? How might I stretch and magnify the audience's role?

Some of these heuristics may seem antithetical to the role of the traditional technical communicator. Until now, technical communicators primarily have created content for information, consistency, and usability. With immersive technologies, technical communicators require a journey mindset that includes practice of participatory design to identify how individuals connect the content with themselves (identity) and their environment, as well as skills to create content for a journey that is dynamic, inconsistent, highly evolving, and incredibly personal for each participant. Technical communicators must also consider how we, as the designers/creators/participants, shape the content based on practicing empathy and engaging with the journey.

Conclusion

Technology companies are putting vast amounts of money and research into infrastructures for immersive technologies, and the "AR Cloud" will bring immersive content ever more intertwined with the real world. "As we move toward a future of immersive technologies and artificial intelligence, we need to anticipate new ethical challenges and develop practices and policies for a world of deeply immersive experiences" (Craig and Georgieva). This new landscape requires technical communicators to move outside the realm of writing to acquire understanding of various disciplines that help with creating a more informative, engaging, and ethical experience. We are no longer involved primarily in the *dissemination* of quality information; we are now combining that with the experience of *engaging* with that information in immersive landscapes. We look forward to the journey.

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Has Narrative Found a Challenge in Virtual Reality?

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By MICHAEL HUMPHREY

THE COMPLEXITY and the context of what we are trying to communicate demands both certain techniques and technologies. But the question is, can narrative and VR enhance one another? The answer might very well lie in our brains.

You likely have had the experience of wanting a piece of information and feeling frustrated. Rather than simply stating the fact or detail, a document might force us to swim through a sea of verbiage to find that one treasured piece of gold we seek.

You likely also have experienced a quite different frustration. The answer was easy to find, but it is so opaque and decontextualized that you are more confused than before. The art of technical communication is to balance the need for details with its context, so that discovery is a process rather than a wild chase.

In many ways, narrative and "information and communication technologies" (ICTs) share the same qualities in the hunt for meaning. They can both either ease the process of understanding or severely complicate it. How information is *designed* rests at the heart of both challenges.

In another way, these two elements of communication work in opposite directions. Narratives work well when they activate some part of our inner world—ourselves and our mental maps of lived experience—and that activation helps us integrate new information. ICTs, on other hand, work well when they send us out into the larger world, mapping new landscapes for us to consider.

Usually, this is not a tension, even in technical communication, but rather a symbiotic relationship. Technologies such as papyrus, books, radio, film, television, PCs, tablets, and smartphones have all held narratives with great aplomb, and both rich inner and outer world understandings are the result.

When you look at the technology of virtual reality (VR), however, the relationship with narrative is more complex. We live in a time when both narrative and VR have returned for another round of consideration. For technical communication, some questions that emerge with them are:

- Is VR useful for my work?
- Does using narrative lead to more efficient and fulfilling understanding, or does it distract?
- Will VR help people learn in more vigorous and functional ways?

The complexity and the context of what we are trying to communicate demands certain techniques and technologies. The questions I have been asking for the past two years, however, are: can narrative and VR enhance one another? Would a VR training in a highly technical field, for instance, work better if a narrative led us through the lessons? These are more problematic questions than they might first appear due to the way our brains process both narrative and VR.

There are three points that continue to recur in research and personal VR experiences.

The brain works differently in VR than other media. VR-brain research is just starting to emerge, but early work shows that VR can be useful in reminiscence therapy, that it can aid in retention in training, and most intriguingly, that it affects our hippocampus, which is essential to memory and our sense of space.

Testing VR mazes on rodents, UCLA researcher Mayank Mehta found that while the animals tracked down rewards as easily as their peers in physical mazes, the brain function was completely different. In VR, the animals shut down more than half of their hippocampus cells. What this means, exactly, will be more clear with much future study, but that change in brain function is important, because it tells us that our brains adjust powerfully in virtual realms.

The brain works differently in certain kinds of narratives. Over the past 20 years, researchers have found that we process information differently in narrative when we become "transported" by a story. Transportation is an effect of feeling so engaged in the arc of the main character that we replace our own place in the world for a time. Most importantly, our attitudes and intentions to act will reflect the story rather than our normal dispositions.

VR Immersion and Narrative Transportation might not blend well. Because VR has such an effect on the mind, which we will call immersion to keep things simple, the normal effects of narrative media (books, films, radio, etc.) might not appear. So, narrative might take on a different role in VR states.

What do these research findings mean for the technical communicator? First, it likely means that those pioneers of using both narrative and VR in their communications will need to experiment. The properties of each, alone, have already proven rewarding. But when used together, we do not yet know what works, what we should avoid, and how the natures of the technique and technology might create new forms. If there are any guesses to be made, we might as well listen to the original VR pioneer, Jaron Lanier, who told *Wired* last year, "... virtual reality is a future trajectory where people get better and better at communicating more and more things in more fantastic and aesthetic ways that becomes this infinite adventure without end ...."

How that adventure includes technical communicators is likely based on the desire to try and the willingness to waste a little time seeking that one treasured piece of gold.

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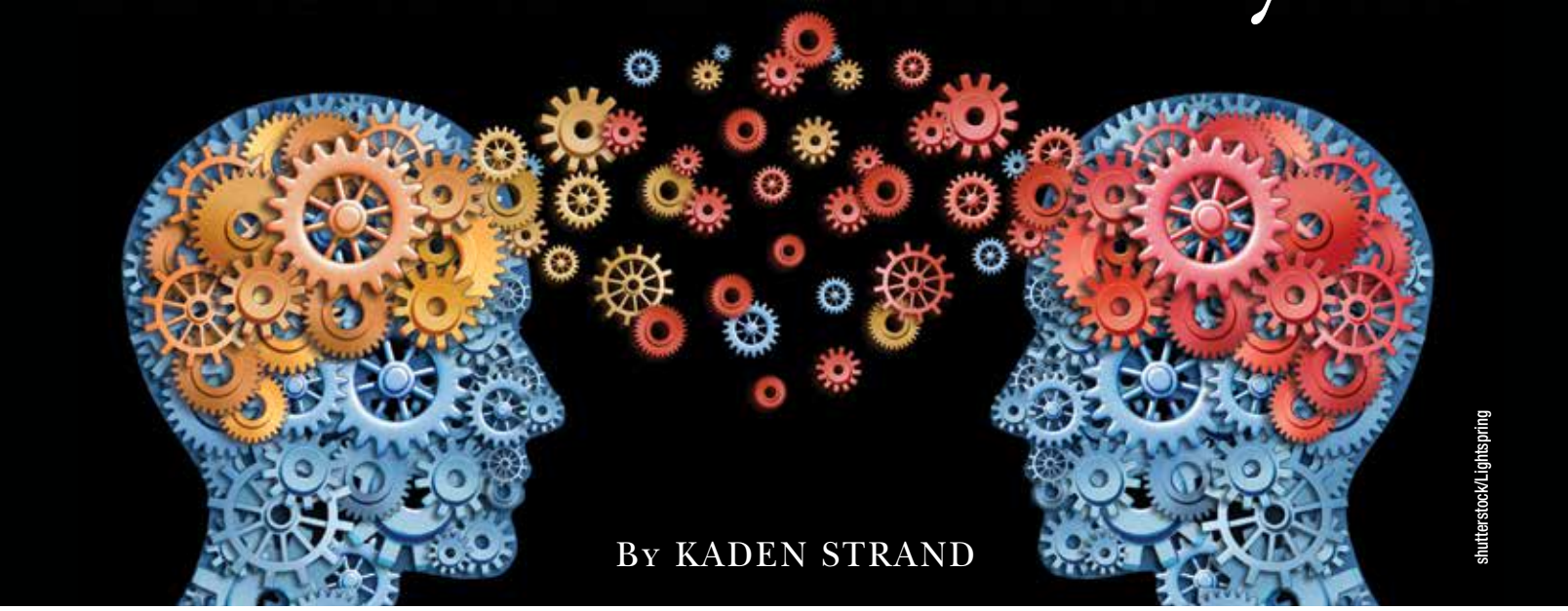
Sharing Ideas in Mixed Reality



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By KADEN STRAND

THERE IS A GREAT DEAL of hype for how virtual reality and augmented reality technologies (VR/AR), (collectively referred to as "mixed reality") will radically transform how we share ideas and will impact education, training, visualization, and social communications. While many excellent prototypes of mixed reality experiences show potential in these areas, it can be challenging for individual professionals, educators, students, and enthusiasts to create and share mixed reality experiences without a strong technical background.

Beyond gaming and entertainment experiences, mixed reality has untapped potential for individuals to explore and share their own ideas and data, especially in the sciences. New authoring tools, shareable 3D formats, and web-based VR are among the emerging technologies rapidly lowering the barrier of entry for individuals to create and share their ideas in mixed reality.

Most mixed reality experiences today are created by content development studios using game development software, such as Unity or Unreal engines. These platforms are tremendously powerful and enable skilled users to create sophisticated virtual worlds. Individuals from many backgrounds are spending time learning these tools, and with some programming experience, it is not too challenging to learn the basics of building a simple mixed reality experience.

However, if you are an educator or scientist working with your own data, and you want to simply view a 3D model, plot 3D variables and mathematical functions, examine GIS topography, view a chemical structure, or explore other data-driven scenarios in mixed reality, it can be prohibitively time-consuming to develop a custom program within a game engine simply to view and share your data in VR. In many cases, data must be entirely reformatted, or different programming languages must be used to work with the game development platform, and each feature must be carefully integrated into a final executable program. As new headsets, interaction methods, and use cases arise, these programs must then be updated and re-distributed. Non-technical users often partner with software developers to bring their ideas to life in virtual environments.

Creating VR with VR

Many companies are working to address these challenges, and some of the most exciting advances enable non-technical individuals to create, share, and annotate virtual environments. For example, Google's Tilt Brush and Oculus's Quill and Medium tools allow users to draw, sculpt, and animate 3D objects and environments directly inside VR. Microsoft's new Maquette software allows the authoring of more sophisticated virtual environments from within VR, with the ability to include 3D models from content libraries; annotate scenes with text, icons, pictures, and videos; and set up viewpoints and transitions between scenes—all with a point-and-click interface requiring no programming. The quality of these experiences depends on individual artistic vision and clarity of thought.

3D file formats for sharing the objects and environments created in these programs have become more fully supported for sharing on the web and in desktop programs, such as PowerPoint. For instance, models can be uploaded to SketchFab and then easily shared or embedded into web pages. The Chrome, Firefox, and Edge browsers have even introduced support for WebVR capabilities to access fully immersive views of VR web pages, such as SketchFab scenes, directly in the web browser.

A Soup of Ideas: The Value of Composable Design

Consider how content is created and shared on the Internet. A single blog post can include text, pictures, videos embedded from YouTube, and interactive widgets, all composed into a cohesive story. It is easy to mix-and-match content on the web. With a basic knowledge of HTML, it is straightforward to create a web page with a variety of content types, and web development platforms and services further simplify this process for non-technical authors.

Because many topics have become increasingly data-driven, data visualizations have become more sophisticated and used more frequently in professional and educational settings. Many popular visualization tools such as D3.js, Plotly, and CartoDB are web-based, allowing users to flexibly incorporate customized data and embed the interactive results directly within their own web pages to be easily shared. The *Distill* web journal for machine learning research is a leading example of interactive, domain-specific communication.

The A-Frame web framework from Mozilla brings the composable nature of web pages into mixed reality. A-Frame extends the hierarchical structure of HTML into 3D WebVR scenes, allowing for the creation of mix-and-match components sharing the same virtual space. You can access these scenes simply by navigating to a URL with a web browser. An immersive view of these web pages can then be experienced with a VR or AR headset, or viewed from a desktop, tablet, or mobile device as a 2D perspective.

Data visualization and educational tools developed as A-Frame components benefit from this composable design, allowing users to flexibly create and share 3D scenes with a variety of content and automatic support for mixed reality headsets.

Example Scenario: Chemical Visualization

One example of a leading web-based scientific visualization tool for 3D data is the NGL Viewer, used for examining chemical models. Over 140,000 complex chemical structures in the Protein Data Bank, such as antibodies, DNA, and viruses, can be directly viewed on a web page. NGL is open-source software funded by grants and sponsorships, and must prioritize which features to include in the chemical visualization software. This means that extra features, such as VR/AR headset support, multi-user networking, advanced animation tools, and artistic post-processing are out of the scope of the project.

If the NGL viewer was designed as an A-Frame component, a user could incorporate these extra features by including additional A-Frame components in a custom WebVR scene. To explore this idea, Blue Penguin is working with Colorado State University to develop a proof of concept NGL component for A-Frame. Using this component, molecular structures can be easily mixed with other components, such as text annotations and additional 3D models, in a WebVR scene. This design provides much greater flexibility and extensibility to meet custom use cases in education and research, allowing students and instructors to easily create and share VR-enhanced websites describing complex chemical concepts.

A-Frame scenes and components include additional benefits:

- Automatic, cross-platform support for 2D browsers, as well as virtual reality and augmented reality headsets
- Loading of in-scene pictures, videos, and 3D models
- Complex scene and background components such as 3D.io, allowing full interior design of virtual spaces for educational or aesthetic purpose
- Additional VR/AR interactions as controllers, gestures, and speech inputs evolve
- Networking components for cross-device, multi-user collaboration
- Powerful animation system components and artistic post-processing components, enhancing the quality of visual explanations
- Virtual video capture and export, as well as recording of full 3D motion capture

Tip of the Iceberg

The introduction of VR as a web-accessible communication medium opens new possibilities for organizing and sharing ideas. For example, instead of multiple pages or long-form scrolling, there may be improved spatial layouts for communicating ideas. Imagine a reader engaging with an interactive, museum-style space where they are free to inspect the flow of information in a non-linear manner. Soon, visiting a web page will mean stepping into a cornucopia of sophisticated, interactive holograms connected by individuals ready to share their ideas in a new way. i

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RESOURCE *Distill*, a web journal for machine learning research, *https://distill.pub/*.

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A Mixed Reality Model for Immersive Learning Environments

By MYRA TRAVIN

IN THE FULL IMPLEMENTATION of mixed-reality environments, the architecture concept expands to include other forms of information design—not just visual, but also verbal. Currently, educational authoring tools can create barriers to implementing fully immersive environments. Given this, a transitional approach—one that includes other immersive information landscapes—can be integrated into an AR/VR implementation approach.

As Coulter writes in 2017:

> "In 2011, Ernest Cline wrote a great book, *Ready Player One*, which described an apocalyptic world ravaged by overpopulation and pollution. Granted, that is nothing new for science fiction, but what was new was the mechanism that denizens of this reality used to escape the horrors: a virtual universe called Oasis. In 2044, most people in Cline's universe are plugged into this alternate reality nearly 24/7. They attend school there, socialize there, work there and, yes, they game there. When I read this, I was at once fascinated and, I will admit, somewhat frightened (which was, I believe, the intent). If we are to be both fascinated and frightened, simply by the concept of mixed realities, it is necessary to understand the current reality and barriers in development to immersive learning environments in general."

Unfortunately, most current learning design is based on user interface and user experience (UI/UX) parameters that seek to expeditiously move learners through content. The design is based on the needs of the designers and content creators, rather than the decisions of the learner. As eLearning has become ubiquitous in corporate environments, the pressure to continually keep up with the pace of new content and technologies creates more confined paths for learners to follow. That can have the opposite effect that an immersive design has on a learner, if they feel their paths through content are restricted.

Given that the landscape of AR/VR is on the cusp of being used within many actual proof-of-concept use cases—in corporate, military, government, or private-sector studies—having a transitional model that moves from a more traditional concept of distance education to an immersive environment might be helpful for introducing a strategy that bridges the gap between the two concepts.

What Immersive Environments Have in Common

A key factor in the integration of immersive technologies is understanding what characteristics they share. For example, they put the learner at the center of the experience, and seek to provide as robust and engaging an environment as possible. The natural sense for the learner should be that they are fully within a learning environment and not separate from it. In other words, they should experience a sense of following a line of personal interest—one that is not bounded by others' design or content obstacles.

The factors present within AR/VR or extended AR/MR/VR/XR environments—real-world experience, integration of the five senses, and cognitive engagement, for example—can also be found within other learning strategies, such as verbal interface narratives. If you combine visual, verbal, and AR/VR characteristics into one environment, you can use the salient and connective experience features of all three to allow for a more immersive overall learner experience.

Immersive environments are a transitional concept that are cost-effective and allow for rapid prototyping in the areas in which AR/VR technology will have the greatest effect—simulations, gaming-decision structures, and historical environments. Immersive environments also take advantage of the power of verbal storytelling with such devices as Amazon Alexa and Google Home, which create internal immersive experiences.

As more and more AR/VR devices become prosthetics for shared real and virtual environments, and as light implanted devices lead to more intimate implementations of the technology, there might be less need for a mid-term design solution as the technology becomes more affordable to implement. Steven Kan, the Head of Global Strategy, AR and VR at Google, suggested in a recent keynote that "eventually, the gears will be in the form of lighter wearables—even in the size of contact lenses—so that the virtual and real world would become 'indistinguishable.'" Yowza.

In the meantime, using such internally immersive concepts as verbal assistants can be effective. It might also be desirable, however, to shift from virtual to internal-experience, assistive-device environments, where learner choice is less limited. In fact, there is great interest in the interactive nature of voice assistants for higher-education settings, where such devices are being used in connection with university classes. As with any adaptive technology, we must still resolve the ethical considerations, such as the ones that occur regarding data collection and usage.

Designing for Immersion

In the design of collaborative device environments, it is critical to evaluate where the best use of each strategy meets the overall instructional goals. Where is it best in the curriculum to fully implement VR, and where can an assistant like Alexa be deployed for narrative introductions or Q&A sections? Where would it be reasonable to introduce an AR mapping exercise with sound, video, graphics, or GPS data, and then create an assistant-based testing module? Or a Google Street View experience that has a Google Home introduction for course concepts and requirements?

Dian Schaffhauser writes in the *T H E Journal* (Technological Horizons In Education) about

> "…applications where teachers have worked with students to add interactivity to books they're reading. They take a video of themselves, and then when another student or a parent runs the app, the student appears on the page to explain something. Or schools have used the software to add interactivity to their yearbooks. Out of the cover of the book comes the yearbook staff, and the yearbook teacher is saying, 'Hey, this is the yearbook staff, and we hope you really like it,' then music plays and you walk through the hallways of the school. Mixed realities of verbal, visual, and experience can open a world of possibilities."

There are many collaborative designs that can be created and used in much shorter development times, instead of full-out AR/VR implementation. It is an area of design that we might not be considering, because we want to fully implement a reality-based technology solution, but it could be of great help if we choose to use collaborative strategies in concert with one another as we consider the pros and cons of both and the best way to integrate them for the most effective implementation.

Conclusion

What are the information architecture and usability implications and opportunities for AR/VR? They have drawbacks in development time, cost, usability, and ethical considerations, but great promise in learner engagement and outcomes. One way of dealing with the information architecture issues is to consider a multi-device and multi-channel collaborative approach that has its nexus at the point of learner experience. If the devices share that main concept, it is up to the designer to uncover the best landscape for learners to experience reality: internal, external, or shared.

As Michael Ngan suggests, "VR is about to take over the world of human senses and communication. Driven by continual improvements in functionality, lower cost, and a boom in content creation, the market for the technology is expected to reach a huge U.S. $120 billion in size by 2020."

We need to be open about the concepts and approaches to mixed realities as we grow into this bold new future.

MYRA TRAVIN *(myratravin48@gmail.com) is an innovative LX designer and pioneer in post-future immersive learning environments. She is the author of* School of You *and contributor to* The Language of Learning.

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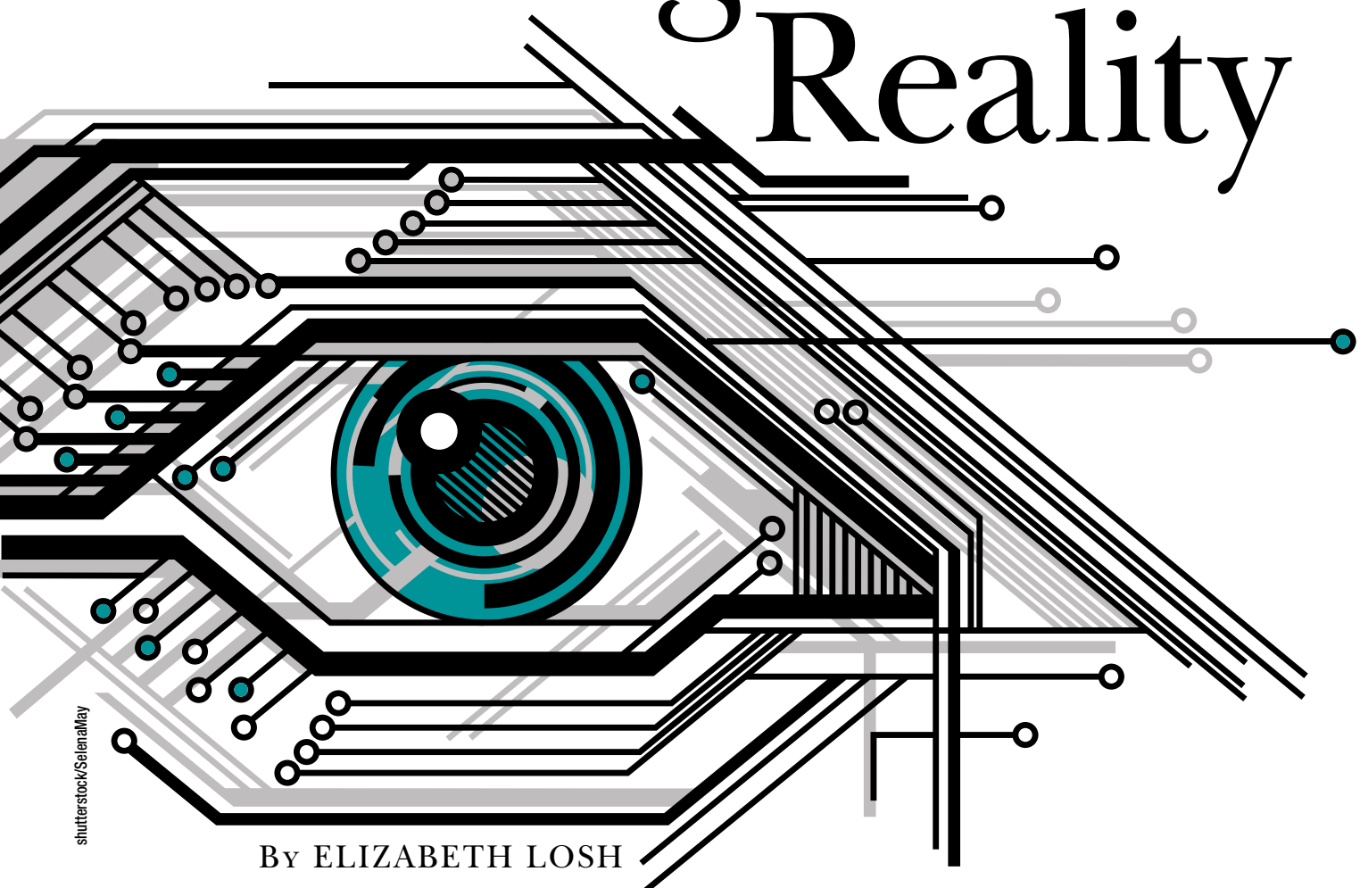
Machine Vision and Augmented Reality



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By ELIZABETH LOSH

THE CAMERA OPENS on a group of musicians preparing to play a string quartet by Debussy. As the music swells from their instruments, rectangles appear and begin to follow their faces.

Guesses from biometric algorithms flicker over the circle of players, trying to classify the musicians by gender, age, and current mood. The system is clearly fallible, shifting between genders as musicians turn their heads and cycling through wildly improbable ages with each changing expression.

Soon frames appear all over the scene. A female violinist is identified incorrectly as a "black chair with a red umbrella." A stand with sheet music is mis-tagged as a "white wooden table." Clearly, the computer is struggling to make sense of complex moving images, using its training data to interpret the patterns it thinks it perceives.

As the film by artist Trevor Paglen progresses, the computer vision becomes more abstract, and the images are captured by software progressively more divorced from the domains of human sight. The viewer to Paglen's installation in the Smithsonian is now watching the performers through algorithms used in self-driving cars, guided missiles, and aerial drones.

Although this footage may seem bizarre and otherworldly, it is important to remember that today, words and images are much more likely to be read or viewed by machines than by human beings, as enormous quantities of data are filtered, correlated, aggregated, and sorted by algorithms designed for digital archives, search engine portals, social network sites, and systems policing intellectual property, national security, public safety, civic propriety, medical normality, and gender conformity. Use of these algorithms as a substitute for human interpreters tends to raise many anxieties, particularly among those who worry either about omnipresent surveillance or about a total abdication of oversight possible in the very near future.

The Trouble with Algorithms

Another of Paglen's artworks is a black-and-white silver gelatin print of Shoshone Falls, Idaho, an expanse of sublime nature representing the American West that was also captured by the lens of Timothy O'Sullivan in 1874. In Paglen's version of the waterfall, two different computer vision technologies have been applied: a program to recognize faces and one to demarcate road boundaries. Although the image deploys a traditional aesthetic associated with antiquated technologies, rectangles appear around ghostly faces and perspective lines highlight hallucinated thoroughfares. Thus the placid image hints at two radically opposed nightmares about computer vision: A dystopian environment of constant monitoring with no sanctuaries of privacy, or an equally dysfunctional world of self-driving cars running amok, haphazard medical diagnoses, and other attempts to automate the labor of preserving safety and health. Between the Scylla and Charybdis of surveillance and abdicated oversight, how are humanists and educators supposed to navigate the contemporary machine vision landscape?

Machine Vision Revolution

Critics like Jill Walker Rettberg have noted that the last great technological change in visual culture during the Early Modern period connected the sciences and the humanities closely, as humanist thinkers considered the philosophical, aesthetic, and cultural ramifications of techniques for representing linear perspective and anatomical proportions and optical devices like the camera obscura, the microscope, and the telescope. Yet the machine vision revolution has been relatively unexamined in the humanities, even in the digital humanities. As Rettberg points out in one of her Snapchat Research Stories, interacting with biometric grids and machine vision algorithms has become a normal part of day-to-day communication using augmented reality technologies available as filters on smart phones. For many people, augmented reality offers a way to try on new identities or engage in social performance and play.

Ethical Considerations

Given the obvious limitations of current machine vision technologies, it is understandable in academic contexts that their expert analysis could be co-opted by complicated black-boxed machines—either hobbled by the hubris of immature artificial intelligence technologies not ready to be launched, or endowed with inhumane efficiency that nullifies consent and creates fear.

Companies like SenseTime are already encroaching on the prerogatives of higher education. Using machine learning algorithms and training data derived from the profiles of over a billion Chinese citizens, SenseTime promises that misbehavior could be eliminated, along with anonymity. When I visited one of their labs at the Chinese University of Hong Kong in September, researchers boasted of their university connections, particularly a recent high-profile alliance with MIT. During my tour, they appealed to my identity as a college instructor. Just as SenseTime could automate taking attendance, thereby freeing up faculty for higher order tasks, by using the same software used to identify shoplifters in a mall, the company's products could also identify students who were inattentive or sleepy, using the same algorithms being tested on the faces of drivers in city traffic. Just as the danger of causing accidents could be overcome, bored or drowsy students could be alerted that they were at risk of missing critical material.

The Potential of Machine Vision

Bethany Nowviskie has celebrated the potential of such advanced visual recognition algorithms as a boon to scholars of the environmental humanities, who will be able to mine the millions of images in the Biodiversity Heritage Library that are drawn from centuries of gorgeous notebook sketches and lavish book illustrations. Nowviskie encourages humanists not to hide from machine vision, even if our natural tendency might be to try to make ourselves invisible to its gaze—a camouflage strategy focused on outsmarting the machine, which has been literalized in the work of digital artists like Zach Blas and Hito Steryl.

From the perspective of my own campus, William & Mary, I get to see an international team of faculty, librarians, and students undertaking the daunting task of interpreting and curating over 300,000 pages of archival materials from the British Royal Archives to produce the Georgian Papers Programme, an ambitious digital humanities project aimed at analyzing a complex era of exploration, colonialism, cultural diffusion, and revolution with primary sources that include essays, letters, reports, inventories, recipe books, menus, and didactic material for the children of the royal family.

Some tasks are made more manageable by using Transkribus, a cursive writing recognition tool that can be trained on a sample of the individual's handwriting. Although many of the manuscript pages with the script of George III show his erratic state of mind during periods of mental disorder, the large samples available with his penmanship make it possible to automatically code large collections with his handwritten documents.

Rather than study the static paper documents that memorialize the Georgian kings, I scrutinize multimedia digital artifacts that compose the record of today's political leaders. As channels for content multiply, new computational and visualization techniques can foster new forms of humanities scholarship and public access to historical records. Now that the speeches of contemporary political leaders are recorded and archived, humanists have a rich record of public rhetoric to analyze that includes facial expression, bodily gesture, vocal performance, and frequently the use of sets and props.

Conclusion

I am enthusiastic about using machine vision technology in my own research on digital rhetoric and incorporating it into my teaching to help students interpret complex moving images. Visual rhetoric has a long tradition in the humanities that includes analysis of symbolic objects in portraits of world leaders or the choreography of their oratorical performances. This approach to digital humanities can be integrated into more traditional rhetorical analysis, because elected office holders also produce memoirs, letters, editorials, and other forms of written discourse. Speaking personally, machine vision doesn't make me feel alienated by technology, because it opens up new forms of collaboration, new ways to approach our objects of study, and new evidence for arguments that can enhance our civic understanding.

ELIZABETH LOSH, PHD *(*emlosh@wm.edu*) is Associate Professor of English and American Studies at William & Mary, specializing in rhetoric, digital publishing, feminism & technology, digital humanities, and electronic literature. She is author of* Virtualpolitik: An Electronic History of Government Media-Making in a Time of War, Scandal, Disaster, Miscommunication, and Mistakes *and co-author of* Understanding Rhetoric: A Graphic Guide to Writing*, Second Edition.*

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STC

STC's 2019 Election Final Slate

THE STC NOMINATING Committee (composed of members Jackie Damrau, Jamie Gillenwater, MaryKay Grueneberg, Larry Kunz, and chair Alyssa Fox) is pleased to announce the final slate of candidates for the 2019 Society election:

President

Ben Woelk will automatically succeed from the office of Vice President

Vice President

Craig Baehr
Alan Porter

Treasurer

Jim Bousquet

Director (two positions to be elected)

Bethany Aguad
Laura Palmer
Kirk St.Amant

Nominating Committee

(two positions to be elected)

Sara Feldman
Jack Molisani
Li-At Rathbun
Kelly Schrank

Congratulations to the candidates, and thanks to all STC members who expressed interest in running for office. Note that the final slate was prepared in accordance with the current Society bylaws. The final slate for the 2019 election includes candidates appearing on the preliminary slate, as well as any qualified individuals who are properly nominated by petition and approved by the Board of Directors. The Society election opened on 25 February and will close on 11 March 2019. To be eligible to vote, members must have paid their dues by 1 February 2019.

In Memoriam: Barbara Beresford, 21 October 1961–13 September 2018

BY DEANNE LEVANDER | *STC Fellow,* and **LILY KEIRE**

STC TWIN CITIES Chapter leader and STC promoter Barbara A. Beresford passed away on Thursday, 13 September 2018. She may be gone, but she can never be forgotten. Whatever it was—theater, the violin, STC, animals, rain gardens, technical writing and writers, minimalism, friendships—Barbara immersed herself completely. She was not content to sit on the sidelines of *anything.*

Barbara leaves behind all technical writers who share the love of making information more accessible. With her insatiable curiosity, Barbara loved to learn and collaborate with people. Her enthusiasm for the field was infectious, and she nearly single-handedly revived the Twin Cities Chapter after it dwindled following the most recent recession. As one local employer said, "I was immediately impressed with her professionalism and sincere dedication to her line of work. These qualities made her one of the best STC leaders of all time."

As a mentor, Barbara brought student interns into the chapter, helping them create a technical writing identity through their participation in the Twin Cities community. These interns helped to organize files, set up social media channels, write newsletter and website articles, do the backend work for the website migration, and draft official documents needed to run the organization. It was a win-win situation: students gained valuable experience and STC-TC got organized. This was the result of Barbara's inner drive and initiative.

Two years ago, she promoted an art event on the local public radio station, and based on her recommendation, a group of technical writers and other professionals gathered to listen to an opera in a park. One of her strengths as a leader in the technical communication community was her ability to pull people together to promote the profession and to engage prospective members. She was a speaker, a mentor, a mover, and a shaker.

As the principal technical writer at a biometrics development company, Barbara was responsible for all documentation in the company. She initiated and implemented a help system for vendors, customers, and employees. With her insatiable curiosity, she loved to learn and collaborate with people. She *was* the subject matter expert who worked directly with developers and marketers to put information that was needed where it was needed. As a team leader at a different company and drawing from her theater background, she steered team members to roles that fit their strengths. One of her former colleagues wrote, "I owe much of my success on that job to Barbara's leadership."

Instrumental for keeping the STC Twin Cities community going, Barbara was diligent and persistent, organizing monthly programs that appealed to a variety of members. We are all very sad that she left us so soon and so suddenly, and that we cannot personally thank her for all her contributions. Barbara's career in technical communication has ended, but her influence on STC—and Twin Cities Chapter members—endures. With gratitude for her help and support, the Twin Cities Chapter and all of STC will miss her.

By Deanne Levander (STC Fellow), Lily Keire (STC-TC President), and other STC members from the Twin Cities community and beyond.

Things to Do in Denver When You're Here for the STC Summit

BY CARRIE SHEAFFER | *STC Member*

ARE YOU LOOKING for more reasons to come to Denver for the STC Summit this year? We can give you a few! After all, there's a lot going on in Denver these days, and there's something for everyone. We've got a great economy, a great climate, and great people. We have a thriving arts and culture scene, good restaurants, and an active community.

And on top of that, Denver International Airport was recently ranked as the best large airport in the U.S. How can you beat that?

To help keep you entertained during the Summit, the Rocky Mountain Chapter is planning several events that you won't want to miss:

- Monday Night: Dine Around
- Tuesday Night: A party option and a mellower option
- Wednesday after the Summit: Hiking in the foothills and baseball

Keep an eye out for updates and ways to sign up!

Eat Great Food

The Denver food scene is excellent, and there are a lot of options both near the hotel and further afield. Within walking distance of the hotel, you'll find:

- 16th Street is the main downtown walking street in Denver. There are many restaurants at all price points along the strip. There is also a free bus that goes along the street, stopping at every block.
- Sam's #3 – Diner food with generous portions, very close to the hotel. This place doesn't take reservations.
- Larimer Square is block of shops and restaurants and a favorite evening spot, and within easy walking distance of the hotel. A few favorites:
  - Euclid Hall – Good pub food from one of Denver's premier chefs.
  - Rioja – Upscale Mediterranean dishes in an elegant environment.
  - Corridor 44 – Champagne bar and restaurant.
- Union Station is Denver's historic train station, now a shopping and restaurant hub.

Tour a Brewery

Microbreweries are *very* popular in Colorado, and Denver is full of breweries and tasting rooms. It's not all about beer: you can find great locally-brewed cider, as well as other spirits. And if you're of a non-alcoholic mind, look for kombucha offerings at most breweries. You can even tour the Celestial Seasonings tea factory if that's your thing! Here are some of our favorites:

- **Coors Brewery** tour. Not a fan of microbews? Tour the Coors factory in Golden, CO!
- **Stranahan's Colorado Whiskey** tour. If you are a whiskey aficionado, you might be interested in Stranahan's whiskey. This facility is closer to downtown (but still just a car ride from the hotel).
- Walking tours. Want to try a few different places? A walking tour is your best bet. You can find some self-guided options, or there are guided options, if that's your preference. One popular area is RiNo (just a short drive from downtown), which is home to some good beer and ciders *and* good food. Check out **Stem Ciders** for cider, **Epic Brewing Company** for beer, and **Osaka Ramen** for food. These three spots are all within a few blocks of each other.

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Bucket of hopps from the Coor's Brewery tour in Golden, Colorado.

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Red Rocks Amphitheater

- Tap houses. Just looking for a convenient way to try various things? Look no further than a conveniently-located tap house. **Freshcraft**, **Falling Rock**, and **Great Divide** are all good options.

Go to a Museum

Are you a museum person? Denver has some great museums, many of them downtown and walking distance from the hotel. Standouts include:

- **Denver Art Museum**, famous for its vertigo-inducing architecture.
- **Clyfford Still Museum**, a newer addition to the Denver arts scene.
- **History Colorado Center**, where you can learn about Colorado, and lust over the Native American jewelry at the museum gift shop.

Interested in something a little different? Try these options:

- **Molly Brown House Museum**, which covers the history of the Colorado Gold Rush and unsinkable culture icon Molly Brown.
- The **Denver Mint** is open week days for tours.
- The **Denver Capital** building is also open for tours, and has a real gold-plated roof.

A little further afield are the **Denver Botanic Gardens**, the **Denver Museum of Nature and Science**, and the **Denver Zoo**.

Catch Some Music

The music scene in Denver is eclectic, with Big Head Todd, Nathaniel Rateliff & the Night Sweats, The Fray, and many others hailing from here. If you watch to catch some music while you're in town, here are a few places to look up:

- **Dazzle** is just a few blocks from the hotel, a jazz club featuring live music every night.
- **Appaloosa Bar and Grill**, a downtown restaurant that often features live music.
- The **Paramount**, a beautiful Art Deco **Paramount** theater, hosts not just musical acts but also speakers and comedians.
- Not within walking distance but worth looking up if you're a music fan are the **Ogden**, the **Bluebird**, and the **Walnut Room**.
- You've probably heard of **Red Rocks**, one of the premier outdoor music venues in the country. May is not concert season and Red Rocks is a longer drive from downtown, but the park is open to the public on days without an event scheduled, and is beautiful any time of year. While there, you can visit the **Colorado Music Hall of Fame**, which is full of memorabilia and exhibits featuring musicians from Colorado.

See a Show

Here's a little secret: Denver has a pretty happening performing arts scene. We have good theater options, plus symphony, ballet, and opera options. And the performing arts complex is right next to the hotel. If you want to see a show while you're in town, here is what's playing:

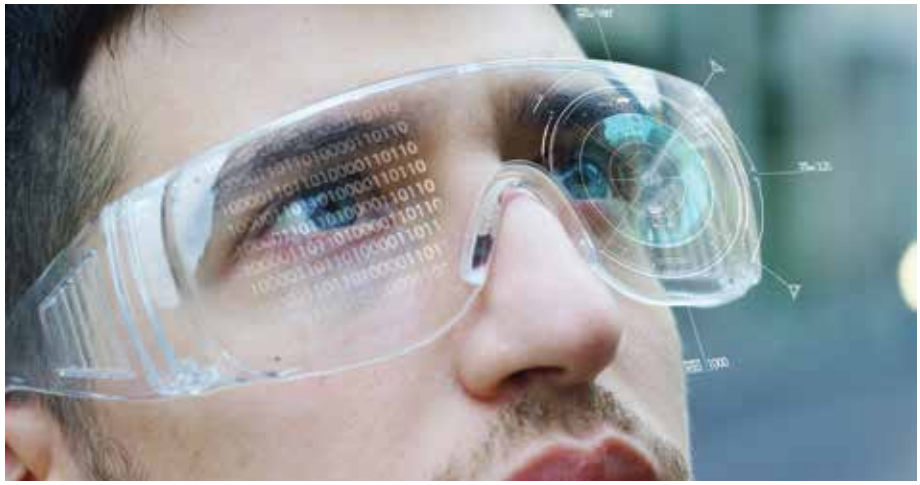
- Colorado Opera: *The Marriage of Figaro*
- Musical: *Wicked*
- Pulitzer-prize winning theater: *Sweat*

Play Outdoors

Coloradans love the outdoors, and the state is *full* of outdoor adventures, year round. If you're ready to venture out of the city and visit the mountains, you'll have many options. When you plan your adventure, don't forget the altitude: Denver itself is at 5,280 feet, and mountain adventures are higher. You'll probably fare best if you plan your adventure for after the STC Summit, and even then you'll likely feel the effects of altitude. Drink lots of water, wear sunscreen, and don't be surprised if you find walking uphill *much* harder than it is at home.

- If you want to admire some natural beauty, **Rocky Mountain National Park** is only about an hour and a half from Denver. The park is beautiful any time of year, and by May some trails will be passable without snowshoes. Estes Park, the mountain town nearest the park entrance, is also full of quaint shops and good restaurants.
- If you want to hike, look for trails in **Golden** or **Evergreen**. These towns are within an hour of the city and have a lot of hiking trails that should be clear by May. Ask the Rocky Mountain Chapter for recommended trails—everyone will likely have a different favorite.
- If you're a skier, **Arapahoe Basin** is your best bet. Their slopes stay open longer than other resorts, but don't expect the best snow so late in the season.

AR Looks Cool, But Where's the Content?



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BY ALAN J. PORTER | *STC Senior Member*

I REMEMBER WHEN augmented reality (AR) was going to be the next big thing. I had AR apps on my phone, and a few friends were walking around with Google Glass. We were on our way to an AR driven world, but that was four years ago. Why hasn't the promise materialized yet? I believe that one of the main reasons is there is a key missing ingredient: content.

I first came across AR about 11 years ago and was soon advocating for it as a potential delivery channel for product service procedures (i.e., technical documentation), but most people seemed to think of it as little more than a curiosity. Today, however, there are new AR companies popping up every week, and some more traditional engineering software companies are literally betting their future on it. Nearly every manufacturing company is experimenting with it, and I've been lucky enough to be involved in several proof-of-concept projects. Yet the vast majority remain just that, proofs of concept. Why, after 11 years, has AR failed to become a mainstream technology?

Because no one gives much thought to where the content is coming from or to how it needs to be created and organized for what is essentially a new sensory experience. Most AR projects are focused on proving the technology rather than designing the experience, and as such, these projects tend to be built around a single product use case and a corresponding content set. Often, the content is designed specifically for the project.

For AR to reach its potential, it needs to scale, and as a user experience driven by visual images and accompanying text, it needs the underlying content to scale as well. I will admit to be being the annoying guy at AR demos who asks, "Where's the content coming from?" It's a question we should all be asking. Those of us in the field of technical communications are best positioned to provide the answer.

We should no longer be thinking of ourselves as technical writers. We are now (or should be) customer advocates helping define and map the customer experience from the outside-in perspective. The arrival of new delivery channels and technologies like AR give us the perfect opportunity to become *the* subject matter experts on how to plan, create, and deliver the content needed to drive the experience.

Content to drive an AR experience needs to be modular in design, and it needs to be modeled and tagged with the right metadata to deliver the right experience, depending on the environment, process, and context of whatever the AR user is viewing through their device of choice at any particular time. The content must also be written to answer questions, or provide guidance within that context, removing a lot of the environmental assumptions that underlie many current content sets.

In today's screen driven world, we can no longer predict or control what device our customers use to access our content or (thanks to the pervasive use of search technologies) where in the narrative flow they start to consume content. We are learning, however, how to adapt and plan for that. We can take those lessons and use them as the foundation for producing relevant content in a near future where the screen is no longer the dominant interface—a combination of voice, optics, and heads-up displays means that we can't anticipate what our customers will be looking at when they want access to information.

I'm still a firm believer in the idea that the AR revolution will happen. We just need the optics technology to take a leap forward and make sure we have a critical mass of relevant, modular, intelligent, tagged content ready to feed it.

As pre-sales content and post-sales content begin to overlap, Alan Porter provides the latest insights about our role in that evolution in Convergence Conversations. Learn through this column to build bridges and form synergies with your counterparts in marketing. Contact Alan at *ajp@4jsgroup.com* to ask a question or propose a topic for him to cover in this column.

The Cognition of Recognition and Usability

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BY KIRK ST.AMANT | *STC Fellow*

EVERY SECOND, we are bombarded by more information than our brain can process. Yet, our minds can quickly sift through that data, identify what is important, and act on it. How is this possible? The answer involves how our minds organize sensory input—a process that affects perceptions of usability.

Cognitive Processes

Cognition involves how the brain processes information, which affects how humans assess usability. When we encounter an object, our minds engage in a three-part process to:

- *Recognize* – Identify what the item is;
- *Categorize* – Establish what the object does or how it can be used; and
- *Operationalize* – Determine how to use that object to accomplish a task in the current situation. It all begins with recognition—a process involving short-term memory.

Object Recognition

When we encounter something new, we hold that item in our short-term memory and compare it to the entries we have in a mental database of objects we've encountered before. Specifically, we compare the features of that new item to the features of objects we already know. If the new object looks enough like an entry in this database, we identify it as that kind of item. If, for example, something looks

This column examines how cognitive factors can affect technical communication and design processes. Email the editor at *stamantk@ecu.edu.*

like our mental model for "hammer," we'll identify it as a hammer.

Short-term memory, however, is very limited. This means when we compare new objects to our mental models, we don't compare every possible aspect. Rather, we only focus on certain characteristics. Specifically, we focus on those characteristics we consider unique to a particular item.

Our experiences, for example, have taught us hammers are comprised of a long, thin handle and one end that has a flattened surface for pounding objects. These become the factors we focus on when reviewing new items to determine if they are a hammer. If a new object contains these features, we'll:

- Identify it has a hammer;
- Access our mental database to determine what hammers do (i.e., pound objects); and
- Review our surroundings to determine how to use that hammer in that context (e.g., to pound a loose board into place).

Focusing on certain features versus all features prevents us from overloading our short-term memories. It also explains how we can identify items when presented with limited sensory information. Figure 1, for example, contains only certain features, yet most of us can identify the shape as a triangle.

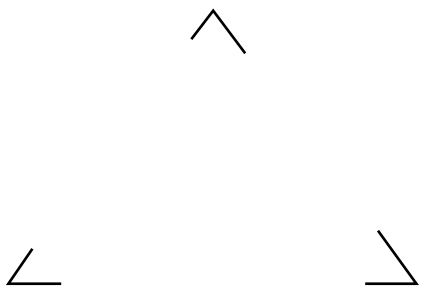


Figure 1. Aspects of a triangle.

This is because the figure contains the key features our minds associate with identifying triangles.

Identification and Usability

Identification is central to usability. If we don't recognize what something is, we won't know how to use it. If, for example, we don't recognize something is a hammer, chances are we won't know we can use it to pound down nails. Usable designs are those that allow users to identify what an item is so that they can determine what it does and how it can be used in a particular setting. This process applies to everything from the tools we find in a toolbox to the apps we find on a mobile phone.

The key to effective identification involves reducing the information the brain needs to process. If I design an icon for "phone call" to look like the model your mind has for "phone call icon," you'll quickly identify it and know how to use it. If that icon does not mirror your mental model, you'll struggle to determine what the item is and what it does. Doing so involves filling the short-term memory with large amounts of sensory input as you review *all* features of the item, because you don't know which are key to identification. This load on our short-term memory is why we often become focused on and confused by new objects. Such factors affect how easily individuals can determine how to use an item.

Designing for Identification (and Usability)

Technical communicators can use this identification process to create usable designs for different audiences. The key is determining the features an audience associates with identifying certain things. To do so, technical communicators need to ask users specific questions about the mental models they use to identify items. This can be done through interviews or focus groups where users respond to these questions:

- *Can you describe an [X] to me?*
- *How do you know it is a/an [X]?* or *What features make it an [X]?*
- *What do you use it for?* or *What do you do with this item?*

The objective is to determine the characteristics individuals associate with the item. It also establishes the minimum common characteristics needed to identify that item.

Per the final question, one needs to confirm the members of a group will use an identified item in a certain way. Such clarification is important, for individuals could effectively identify an object, but associate it with different uses (e.g., using a screwdriver to turn screws vs. to open a sealed paint can). By comparing responses, technical communicators can identify those features an audience associates with identifying and using a particular thing.

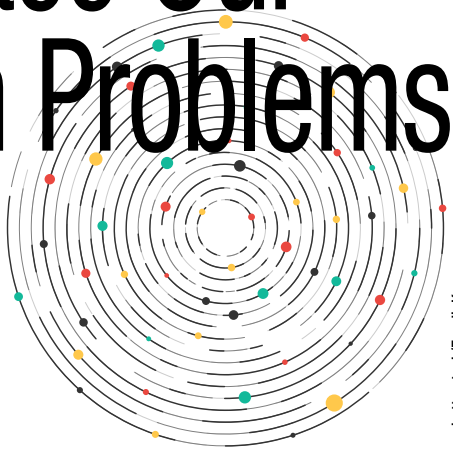
Technical communicators can use this information to create initial designs. They should then use follow-up interviews or focus groups to test these designs by asking these questions:

- *What is this item?* – Determines if it is correctly identified;
- *How do you know it is a/an [X]?* – Determines features used to identify the item;
- *Would you modify this design? If so, how?* – Determines if revisions are needed to facilitate identification; and
- *How do you use this item?* – Confirms common perceptions of how to use the item.

Technical communicators can use the resulting information to modify (and re-test) designs as needed.

The speed with which the human brain works is stunning. By understanding how humans process information, technical communicators can create designs that better address user expectations. An understanding of how the mind identifies objects can guide such processes and lead to more usable designs.

Now is the Time to Face Our Content Supply Chain Problems



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BY CRUCE SAUNDERS

WE ALL KNOW the nature of content is rapidly changing faster than ever before. If you are feeling dizzy or overwhelmed, it's a natural reaction to this new reality. We are facing an unprecedented omnichannel publishing explosion equipped with dated systems and processes—and we fill the gap with more and more manual effort. We are not alone: some of the biggest, smartest organizations on the planet are facing huge gaps between stated customer experience goals and the publishing infrastructure in place to meet them.

The adaptive survivors have realized fundamental changes are necessary and have gotten to work. It's time to realize that nothing will change for the better unless we change it ourselves.

Everything Is About to Change Again

The underlying omnichannel challenge derives from the baseline growth of the number of content assets supporting each of our products. All of these assets drive production of asset variants as we struggle to keep up with new surfaces for customer experience across channels and devices. Every surface, every consumption scenario change, drives new manual content transformation and spawns another variation. Personalizing and localizing the content creates further variants. Each variant becomes a content record with a separate content ID. Publishers just cannot stay on top of all these new content records manually.

We already have a lot to manage, but now new significant content elements are emerging that will further challenge content supply chains:

- Augmented reality (AR) and Virtual reality (VR)
- Voice, chatbots, and other conversational touchpoints
- Expanded personalization and adaptive experiences

Each of these stretch content models, content types, and content operating models even further. In addition, we keep stretching existing content teams to keep up with localization, accessibility, and various regulations.

Take a deeper dive into content evolution for AR by reviewing the article, "Emerging Methods for AR/VR Content Workflows: Moving Content into Three-dimensional Space," printed elsewhere in this issue. AR introduces content model shifts for time, space, motion, and variable user viewpoints.

Each new content dimension impacts content schemas, semantic standards, our content operating model, and our content supply chain design. When content process happens by accident, instead of by design, each new content dimension just adds to the mess.

The Ways We Create and Manage Content Has to Change

Looking beyond technical communication, the number one way content moves throughout the enterprise is still Microsoft Word via email. All content is tied to platforms, people, or silos. Due to departmental silos and lack of automated workflows for structured content, many creative humans in the enterprise have been turned into "copy and paste robots."

Writers are often spending more than half of their time on the mechanics of content, instead of the content itself. This encumbers authors, making them far less productive than their potential. Due to the amount of manual effort involved, the world is currently operating under brute-force content management. We build the same content topic in multiple different ways, and no single team is responsible for omnichannel programs throughout an enterprise.

Everyone is still struggling with the move from a page-centric ecosystem to an intelligent modular content ecosystem, with omnichannel content molecules. As a result, we are facing massive *technical debt*, in the form of misconfigured and out-of-date content systems, and massive *content debt*, in the form of unstructured, duplicated, metadata-starved content sets. Hiding from these changes doesn't make them go away, although many organizations make a policy of

Publishers face many challenges creating a new operating model and orchestration approach for dynamic omnichannel content. This column addresses the changing content ecosystem and the evolving dynamics in the space. Questions, suggestions, or feedback? Email *editorial@simplea.com*.

ignoring innovation until competitive pressures force change. Meanwhile, the debt grows, and content sets atrophy.

Working Within a New Framework Toward Content-as-a-Service

Strategies need to be aligned into structural models and standard schemas. For example, [A]'s Content Intelligence Framework was built to align many different content sets; we use it to connect people, processes, and technology. Whether using the [A] framework or another approach, it is in all cases important to *have* an approach to address the complexity of publishing. We need a point of view to organize all the efforts going into publishing.

To achieve the goal of overcoming sluggish content, it is important to align structural standards. At [A], for example, we achieve this using a Master Content Model, managed separately from content and separately from systems of record. When we adopt standards into our structural standards, including DITA XML, *schema.org*, and industry-specific standards, we make it easier to address heterogenous content sets moving around within one enterprise ecosystem. All of these standards, when expressed in software and data systems, create flow throughout the publishing lifecycle, with the goal of shaping content to deliver via Content-as-a-Service (CaaS) APIs to *infinite* end points.

Now is the time to empower content. Our collective future hinges on the free movement of knowledge, connected to context. We need to evolve from single-use, "disposable" content to "durable," simultaneous-use content—and from heavy-handed governance to responsive and collaborative orchestration

Facing the Reality of the Content Tsunami

Let's start by admitting we have a problem and by recognizing that it is finally time to face the growing onslaught of content by adopting a systemic strategically-driven, engineering mindset. We face a content tsunami, and we must address it with eyes wide open. We can no longer sit and watch it with dread while it grows and gains on us. We cannot afford to manually copy and paste our way out of it long-term. Past experience has taught us that the "throw more bodies and hours at it" solution ultimately exhausts itself and collapses.

A standard schema-management approach, like [A]'s Master Content Model, must be employed as the most stable foundation we can use to build a future-flexible content supply chain. Structural and semantics standards, when they exist, can then adapt to incorporate new content shapes like AR, voice, and segment-based personalization.

Time for Action

If we are to prepare for a more flexible future, which includes AR and conversational user experiences within a personalized environment, we need to start dealing with the fundamental patterns and underpinnings of our content. And we must *not* address these things as separate "new technology" projects.

Every time that we take a "technology first" mindset and buy new tech without paying attention to content structure and semantics, we *split the soul of content* into new schemas—new taxonomies separated from existing content sets.

We can each face the problem and start working toward solutions in our own way, at whatever level. Content intelligence can and does have origins at a departmental level. Individuals have huge influence, when equipped with vision and data. Bridge-builders between content silos gain recognition and often move upward in the organization.

We can start by changing our mindset about who we are and what we do. We're not just creating documentation, we're generating onboarding and training experiences from the knowledge set. Those experiences lead directly to customer retention and affect the bottom line. C-level stakeholders (and budget keepers) must be informed of content's real value for customer experience, strategic nimbleness, and overall market value.

Some actions we can take include:

- Find others who care about content and form a content club: describe the problems in writing; brainstorm ideas and solutions; and learn from webinars, articles, and books.
- Start to quantify the problem: track what it actually takes to produce content in all stages.
- Start inventories of content assets:
  - Expressions and renderings
  - Customer experiences or journeys
  - Exemplars of that content
  - Customer types and segments
- Find ways to streamline content workflows, improving author experience.
- Hack together some starting content diagrams:
  - Identify content types and their relationships.
  - Create an inventory.
  - Start content modeling.
- Share and organize semantics:
  - Even if only via a shared spreadsheet, get agreement on terminology (what we call things) and how we tag things.
  - Make basic, centralized taxonomies. Share with one new group at a time.
- Look for any opportunities to build bridges: bridge builders are the new power brokers.

So, let's shed our fears. Embrace the opportunity of new platforms by pouring new content into structures that connect with the rest of our overall publishing lifecycle and strategic goals for customer experience.

Start with the desired end in mind. Begin with a systems mindset. Start with a flexible content model built on top of solid content strategy.

Mark Your Calendar

Organization Events Across the Globe

FYI lists information about nonprofit ventures only. Please send information to *intercom@stc.org.*

1 3-6 Jan
The **Linguistic Society of America** will hold its 93rd annual meeting 3-6 January 2019 at the Sheraton New York Times Square.
https://www.linguisticsociety.org/event/lsa-2019-annual-meeting
drobinson@lsadc.org

2 28-31 Jan
The annual **Reliability and Maintainability Symposium (RAMS)** will be held 28-31 January 2019 at the Bay Lake Tower at Disney's Contemporary Resort, Lake Buena Vista, FL.
http://www.rams.org/
rams2019@rams.org

3 14-17 Feb
The **American Association for the Advancement of Science (AAAS)** annual meeting will be held 14-17 February 2019 at the Marriott Wardman Park Hotel and Omni Shoreham Hotel in Washington, DC.
https://meetings.aaas.org/
meetings@aaas.org

4 24-26 Mar
The 60th annual **Spectrum STC Rochester Conference** will be held 24-26 March 2019 at the Rochester Institute of Technology, Rochester, NY. This year's theme is "Remember yesterday. Celebrate today. Plan for tomorrow."
http://stc-rochester.org/spectrum-conference/
spectrum@stc-rochester.org

5 5-6 April
The annual **Conduit STC-Philadelphia Metro Chapter Mid-Atlantic TechComm Conference** will be held 5-6 April 2019 at the Franklin Institute in Philadelphia, PA.
https://www.stcpmc.org/conferences/conduit-2019/
conference@stcpmc.org

6 5-8 May
The 66th Annual **STC Technical Communication Summit & Expo** will take place 5-8 May 2019 at the Hyatt Regency in Denver, CO.
https://summit.stc.org/
summit@stc.org

* STC-related event

Writing Behind the Data

SARAH LEIDA | *STC Member*

WHEN TECHNICAL COMMUNICATORS think of writing for medical device manufacturers, writing Instructions for Use (IFUs) is the first thing that comes to mind. In my role as a Technical Writer for the Data Export Compliance team at Smiths Medical, I have yet to write a single IFU. We have a whole pool of technical writers housed in the regulatory department who tackle the challenge of creating clear and compliant IFUs. Consequently, I often find myself clarifying what I do—even for fellow technical writers.

One difficulty in explaining my team and job is finding a way to do it that doesn't sound boring. Most people don't want anything to do with the words "data," "export," or "compliance." However, my role captures the heart of what technical communication is all about—diving deep into a technical, complex subject and conveying it to different user groups in a wide range of outputs tailored to each audience.

What is data export compliance?

The Data Export Compliance team is responsible for designing the systems and processes to collect and publish product data on a global scale. Our team implements a unique device identification system that allows products to be barcoded, scanned, and tracked from our manufacturing floor to their use on a patient. Why do we do this? Medical device manufacturers like Smiths Medical can't sell products into entire countries without first sending mandatory electronic product data. Device manufacturers and healthcare providers need us and our boring data to be able to do business! This product data is the key to full traceability and patient safety. We all like to know where our food has been in its journey from farm to table; now patients and healthcare providers are rightly expecting the same transparency from medical device manufacturers.

What does data export look like?

At first glance, collecting product data seems like a straightforward process. It involves: 1) putting barcodes on our products and packaging; 2) adding product data like brand name, latex information, MRI compatibility, and sterility to our data and document management systems; and 3) sending this data to requestors.

Back in 2013, when only the FDA required manufacturers to submit product data to their Global Unique Device Identifier Database (GUDID), this process was a lot easier. Now the demand for data has grown, and device manufacturers must evolve their systems and processes to keep up with the changing landscape.

To give you some perspective, a mid-sized device manufacturer like Smiths Medical submitted around 24,000 device identifier records by 2016 to the GUDID, and each record contains around 30 attributes describing that product or packaging level. Multiply that by all the countries that require data, take into consideration that many countries require more attributes or different attributes, and you can see how the amount of data and complexity quickly adds up. Product data maintenance and submissions require continual system updates, staying up-to-date on complex, country-specific regulations, and juggling many global data deadlines to keep products available for sale in our markets.

How does technical writing fit in?

My job is to design and create comprehensive technical communication for everything associated with product data. This means writing a wide range of materials, co-presenting trainings for employees, and developing web content for our customers. Initially, I was hired to help with an application implementation and the significant process changes needed to meet upcoming product data deadlines. Throughout the ten-month project, I built a technical communication strategy for the team and designed and authored a documentation set for our various audiences.

By including technical communications in the planning and implementation process, our team was able to identify gaps in documentation and make the resulting communication set one that is comprehensive and useful for our audiences. Many of our employees don't work in product data all the time and need materials that are easy to access and at varying levels of depth. For example, we provide the same information in a 90-page unique device identification training manual aimed at new employees, a one-page new fields quick reference guide for seasoned users, and in a standard operating procedure (SOP) that contains process information important for everyone.

Storing and updating materials on a product data intranet page is also a key piece of our internal communication strategy—it allows users to access the level of depth they need and makes them aware of materials that might be appropriate for new employees or those from other departments.

Being a technical writer on the Data Export Compliance team is all about variety and opportunity. Whether I'm evaluating user groups, delivering systems training, or writing a new SOP, no two days are the same. Because of this, I find my work in product data far from boring.

SARAH LEIDA (sarah.leida@gmail.com) *has almost 15 years of experience in the education and technical writing fields. She enjoys the challenge of taking complex technical materials and making them approachable for everyone. She is responsible for product data technical communication and training for Smiths Medical in Plymouth, Minnesota. Sarah can be found on LinkedIn at:* https://www.linkedin.com/in/sarah-leida-ma-cptc-918b705b.

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Points may be obtained the following ways:

Event	Points
STC Annual Membership (any membership type for Foundation certificants)	2
STC Recorded Webinar (self-study)	1
STC Live Educational Webinar (free, sponsored, and community webinars excluded)	2
STC Online Courses	6
STC Summit Pre-Conference Courses (full day)	6
STC Summit Pre-Conference Courses (half day)	3
STC Annual Summit	8
Begin and complete a college-accredited course related to the Technical Communication field	8
Published articles that relate to any aspect of *Technical Communication* (2/article)	2
Published books publicly available on topics related to *Technical Communication* (5/book)	5
Presentations at conferences related to aspects of *Technical Communication* (2/presentation)	2
Total needed within 2 years post-certification date	**12**

Fees

Exam fees: STC Members $250, Non-Members, $495

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